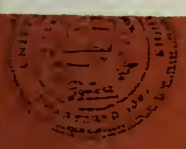

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Growth, Employment and Income Distribution in Egyptian Agriculture: 1964-1979

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ABSTRACT

This paper is a study of the aggregate behavior of crop production in Egypt. We find that output growth rate had declined in the seventies, but there were some signs of recovery towards the end of the decade. This trend cannot be explained by the observed counter-cyclical movements in profitability and in the real price of aggregate output. On the other hand, investment in infrastructure goes a long way towards explaining the trends both in aggregate output and in land profitability. Increased investment in agricultural infrastructure tends to raise the growth rate of the sector and, at the same time, to increase labor's share in production at the cost of the share of property. Our observations suggest that aggregate agricultural supply is not very responsive to prices and that demand for labor is rather inelastic. Therefore, using the agricultural sector as an absorbent of employment shocks in the rest of the economy may lead to significant variability in income distribution.

GROWTH, EMPLOYMENT AND INCOME DISTRIBUTION IN EGYPTIAN AGRICULTURE: 1964-1979

Although various aspects of Egyptian agriculture have been brought under increasing scrutiny in recent years, a comprehensive study of the sector's overall economic performance has been surprisingly absent in the literature. Analyses of aggregate trends are particularly important since agricultural policy questions are typically concerned with the overall behavior of the sector, while most studies have examined the responses of individual crops [1]. These studies, naturally, fail to provide satisfactory analyses of the agricultural sector and of the role of policy in its development. In this paper, we intend to take a step towards filling this gap. Using the Ministry of Agriculture's data base, we examine the major trends in the agricultural sector of Egypt from 1964 to 1979. This will, then, enable us to evaluate the factual basis of a number of recent agricultural policy debates in Egypt [2].

The focus of this study is on the country-wide aggregate indicators of agricultural performance [3]. Indices of aggregate production, aggregate price level, factor shares and total agricultural employment are constructed in order to depict a broad view of the developments in Egyptian agriculture. However, our concern in this paper is restricted to crop production, and particularly left out is animal husbandary. Also, fruits and some vegetables are excluded from our analysis due to lack of complete data on area, price and yield of these well-differentiated products. Production of these crops has been expanding in recent years, but still accounts for only a small

proportion of the total output. However, two major categories of vegetables, i.e., potatoes and tomatoes, are included in our statistics. An extensive discussion of the data base used in this study can be found in Esfahani (1984).

For aggregation purposes we use the Tornqvist-Theil indices which have proven to be reasonable approximations to the aggregate 'true' indices (Diewert, 1976) [4]. These indices are certainly quite superior to the constant-price ones usually employed to measure the variations of aggregate volumes and aggregate prices.

The plan of this paper is as follows: In Section 1, we discuss the main characteristics of the agricultural sector of Egypt. In Sections 2 and 3, the main trends in the production and prices of crops are examined. Fluctuations in agricultural wage and employment are the subject of our study in Section 4. Changes in income distribution are analyzed in Section 5. In Section 6, we look at the trends in the use of non-factor (intermediate) inputs and at the related technical changes in Egyptian agriculture. In Section 7, the development of agricultural infrastructure and investment are considered. And, finally, Section 8 is the summary and the conclusion of the paper.

1. The Main Characteristics of Egyptian Agriculture

Arable lands in Egypt are essentially restricted to the Nile Valley and its Delta which comprise only about three percent of the country's total area. This small but highly fertile piece of land with its rather well-defined borders constitutes the base of an agricultural sector which has been, and still remains, the heart the

Egyptian economy. Although declining in recent years, this sector still employs 45 percent of the country's labor force, produces about a quarter of its GNP, and accounts for more than 30 percent of the exports (World Bank, 1982).

Egyptian farmers produce a variety of crops. From year to year, each farmer rotates his crops over two or three pieces of land so that a uniform soil fertility can be maintained. Since most crops remain on land only part of the year, the same piece of land may be cultivated a number of times each year (usually twice). In addition to multi-cropping, farmers sometimes practice inter-cropping where two or more crops grow on the same piece of land at the same time. Thus, due to the limitation of land and its high fertility, cropping practices in Egypt have become quite complex. Crops not only compete over land and other resources across the field, they also interact over time. For example, if one crop is harvested late, cultivation of another one may be delayed and its yield reduced.

The three-year rotation seems to be the one most commonly practiced in Egypt. Usually, in winter, one piece of land is allocated to wheat and a number of other crops such as barley, beans, lentils, onions, flax, and winter tomatoes. At the same time, the second piece is cultivated with berseem (Egyptian clover) and with a number of the other winter crops just mentioned. Berseem is cut several times throughout the winter season. For most of berseem, the last cut occurs sometime in May or June, but a small part of it is preserved for seeding. The third piece of land begins growing cotton in April which occupies it until August. Since cotton takes a heavy toll of

the nutritional elements of the soil, the land on which it grows has to be fortified by remaining fallow for a while or by growing berseem. This kind of berseem is called 'short-season,' since it is cut only a few times--usually twice. In summer, the first two pieces of land can be cultivated with rice, maize, or sorghum along with potatoes, tomatoes, groundnuts, sesame, and some other crops depending on the geographical location. The third piece remains tied up with cotton which in a sense can be regarded a year-round crop. Other year-round crops such as sugar cane and perennials remain outside this rotation system.

Traditionally, there has been a third season for growing crops in the fall after the annual Nile floods. Crops of this season--usually referred to as 'nili'--have been vanishing since the High Dam brought the floods under control in the early sixties. However, a few vegetables, such as potatoes and tomatoes and some maize are still being cultivated in the nili season.

Table 1 shows the composition of crop production in Egypt and its evolution during the 1965-1979 period. The first notable aspect of this cropping pattern is that it is dominated by only a few crops; namely, berseem, cotton, maize, rice, tomatoes, and wheat which together account for about three quarters of the aggregate crop production. Among these, berseem and tomatoes have dramatically expanded their shares in total crop revenue in the seventies. This must have been a response to the rise in the demand for vegetables and animal products following the high rates of growth of the urban economy since 1974. Berseem is a major feed crop and its expansion has been

enhanced by the hikes in the protected prices of meat and milk. Note that production of potatoes has also become quite significant in recent years. The share of cotton, on the other hand, has been rapidly declining, which is often seen as a result of the low prices offered by the government.

Nili maize was replaced rapidly by summer maize in the early sixties when summer water became plentiful following the construction of the Aswan High Dam. This process continued slowly well into the seventies, but in recent years farmers have shown slightly greater interest in the nili maize again. The share of total maize production in aggregate output, however, has remained roughly constant. The same is true about rice and wheat outputs with shares of 8-9 and 10-11 percent, respectively. Note that rice production experienced a rapid growth in the late sixties, which was probably due to the completion of the High Dam.

Among the less important crops, flax and sugar cane have been the only expanding ones; barley and sesame more or less maintained their shares and beans, sorghum, groundnuts, lentils and onions have lost their significance to various degrees.

An important aspect of Egypt's agricultural sector is the role of its public institutions, with the omni-present network of agricultural cooperatives as their backbone. Theoretically cooperatives provide a two-way delivery system of goods and services as well as a communication network. Plans for the aggregate output of the sector, together with the required inputs of fertilizers, seeds, and credit filter through the cooperative system and eventually are expressed as

farm-level allocations. All cotton output and parts of various other crops are requisitioned by the cooperatives as the government agent. The cooperatives also directly intervene in the conditions of production through pooling of fragmented holdings, by helping the implementation of some area allotments, and by performing various agricultural tasks, such as applying pesticides and protecting cotton plants. Cooperatives often provide tractor services for draft power and stationary threshers at harvest. Goods and services are entered against the farmer's account, and payment is deducted from the imputed value of the requisitioned output. Through these means cooperatives affect production, consumption, and investment in the sector. Also most government organizations and ministries which are directly or indirectly involved in the planning and development of the agricultural sector usually operate through the cooperative network. Enforced membership of cooperatives has been a key tool of sectoral management since the early sixties.

2. Agricultural Production

The agricultural sector of Egypt experienced high rates of growth in the late sixties. This fact is reflected in Table 2 and Figure 1 where we present the three-year moving averages of the aggregate crop-production index. According to the estimates of various sources, the average rate of growth of Egypt's agricultural sector in the fifties and sixties has been about 2.0 percent per year (Ikram, 1980, p. 172). This rate agrees with our estimate of the average growth rate in the second half of the sixties (see Table 2). However, the sector's growth through time has not been uniform: a negative rate of growth

before 1967 turned into a relatively high positive rate between 1968 and 1970 which can perhaps be attributed to favorable weather, to the recovery of the country from the 1967 War, and to the completion of the Aswan High Dam and some of its complementary irrigation projects. In the seventies, agricultural growth rate did not fluctuate much, but it dwelled at quite low levels; it fell rather sharply at the beginning of the decade and started to recover very slowly only after 1974. Average growth rate for the whole 1964-1979 period was 1.46.

The estimates of agricultural growth rates in the seventies, as presented in Figure 1 and Table 2, are somewhat lower than the estimates published by the U.S. Department of Agriculture (USDA), the Food and Agriculture Organization (FAO), or by the Ministry of Planning of Egypt (MOP). The estimates of these sources for the average rate of growth in the early and mid-seventies is about 1.7 percent (Ikram, 1980, pp. 172-173), while for the same period we find rates of about 1.0 percent. Since the above sources use constant-price indices which often underestimate the actual growth, the difference the two estimates cannot be reconciled easily. However, an important source of discrepancy is perhaps the difference in the range of items covered by the estimates. Most studies include in their estimates the outputs of animals, of fruits, and of all vegetables which were expanding rather rapidly in the seventies. Unfortunately, there is no consistent time-series data for all of these numerous and well-differentiated products and our estimates of agricultural growth do not include most of them. Our indices are based on the 21 crops listed in Table 1 [5].

In any case, regardless of the scope and technique of calculation, all sources seem to agree that the growth rate of Egyptian agriculture had declined in the seventies. Indeed, this poor performance in the context of high rates of growth in the rest of the Egyptian economy may have been one of the forces behind the vigorous debates over agricultural policies in the past ten years.

One can of course trace the aggregate production performance back to the trends in the outputs of individual crops. Table 3 shows that between 1964 and 1967 most crops contributed to the general decline of the sector. However, expansion of a few important ones such as berseem, rice, sorghum and sugar cane prevented the aggregate index from falling any further. On the other hand, between 1967 and 1970, outputs of most crops were rising, and the declining crops were the less significant ones. In fact, berseem was the only major crop which did not grow rapidly in this period. In the early and mid-seventies, stagnation and decline of three major crops, namely cotton, rice and berseem, weakened the aggregate performance of the sector to the extent that was hardly compensated by the continued growth of wheat, vegetables, and some other winter crops such as barley, flax and lentils. Finally, we find that the main components of the recent trend toward recovery of crop production are cotton, rice, vegetables and flax. Sorghum and several winter crops such as wheat, beans, lentils and onions have been declining in the late seventies.

3. Agricultural Prices

Many recent studies of Egyptian agriculture have denoted the government price policies as the major reason behind the slow growth

of the sector in the seventies. In this section we examine the main trends in input and output prices in order to assess the relevance of this claim.

Table 3 presents the three-year average growth rates of the aggregate output-price index and compares it with the average agricultural wage rate and with the rural cost-of-living index. A quick look at this table reveals that between 1965 and 1967 the aggregate output-price index rose almost at the same rate as did the average agricultural nominal wages, while the cost-of-living index in rural areas declined. This process was reversed between 1968 and 1970, when output prices fell, nominal wages stagnated, and the cost of living rose rapidly. This radical shift of gears was perhaps due to the fact that after the 1967 War and the subsequent development of foreign exchange shortages the government could no longer finance its 'equitable growth' policies and, thus, chose to resort to heavy taxation of agriculture.

In the early seventies the aggregate output-price index seems to have grown faster than both the wage rate and the cost-of-living index. However, in the mid- and late-seventies wage inflation took off and surpassed the output-price and cost-of-living indices which were growing at about the same rates. Note that if the revenue per feddan (=1.035 acres) of berseem, given in Table 3, is taken as a proxy for the cost of animal power used as an input in agriculture, one finds further indication that profitability of crop production may have been squeezed in the early and late seventies. However, if prices of beef and milk are considered as alternative proxies for the cost of animal power (given at the bottom of Table 3) and subsidies on other

inputs such as fertilizers, fuels, and machinery are taken into account, the picture may becomes less clear.

In order to better understand the movements in the real aggregate prices, we have constructed an aggregate Tornqvist-Theil input-price index and deflated it by the aggregate output-price index (for details see Section 6 below). The three-year-average growth rates of this real input-price index are shown in the last column of Table 2. The result shows that the only times when real output prices have experienced positive growth were the mid-sixties and the early seventies. In fact, average growth figures at the bottom of Table 2 make it clear that on average real output prices have been falling slowly throughout the 1964-1979 period.

This finding at first may seem to support the view that price policies have played a major role in agricultural growth. However, a closer examination reveals some evidence to the contrary. In Figure 1, we have superimposed the graphs of the three-year moving-average growth rates of the real aggregate input-price index on the existing similar graph for total output. One immediately observes that the overall movement of real input prices has been generally pro-cyclical, implying a countercyclical trend in real output prices. This obviously cannot happen unless supply response to prices is weak and production is strongly driven by other factors such as infrastructure, etc., which are complementary with variable inputs. Note that the three-year averaging of the indices and the length of the cycle make it highly unlikely for the phenomenon to have occurred as a result of

lagged supply response. In the following sections we will present further evidence to support this hypothesis [7].

Finally, let us briefly examine the trends in the prices of individual crops. The last five columns of Table 3 show that crop prices have been more or less on the rise in the 1965-67 period, but most of them declined in the following three years. However, in the seventies, in the spirit of the inflationary mood of the Egyptian economy, virtually all crop prices were rising again. Note that prices have not moved uniformly over time or across crops; different crops have enjoyed more rapid price increases at different times. For this reason it is rather difficult to pin point consistent trends in the relative prices of individual crops. Nevertheless, one may observe that in the seventies there has been some increases in the relative prices of sugar cane, berseem, and vegetables. Between 1971 and 1979, on average the absolute prices of these crops grew at rates of more than 13 percent per year. During the same period, prices of barley, wheat, and maize with absolute growth rates of less than 10 percent actually declined relative to other crop prices. On the other hand, relative prices of cotton and rice, the main export crops, were going up at rates close to the average aggregate output price rise of 11 percent per year. Thus, we find that contrary to some claims, cotton and rice were not the big losers of the agricultural price policy; these crops were in the middle range, gaining with respect to some crops and losing with respect to others. Note that these trends in prices more or less correspond to the recent production performance of various crops discussed in Section 2.

4. Wages and Employment

Between 1964 and 1979 nominal agricultural wages rose almost six-fold (Table 4). Although most of this increase was washed away by inflation, according to the index in columns (3) and (5) of Table 4, in the period under consideration labor must have gained about 4.5 percent per year in terms of real consumption or relative to agricultural output prices. However, the growth of the real wage rate in the sixties and the seventies was not uniform (see Figure 2). After a modest growth in the late sixties, the real product wage stagnated and then began to fall rapidly in the the first half of the seventies. This situation changed sharply after 1974 and the real wage made large gains in 1975 and 1976. By 1977, output- price inflation had caught up with the wage increases and the agricultural real wage rate even fell somewhat in 1978, but this was more than compensated by the big jump in 1979.

Column (6) of Table 4 presents an index of agricultural employment between 1964 and 1979. This index is constructed by dividing the total cost of labor by the average nominal wage rate for men [8]. Thus, it represents the movements in the actual daily employment in crop production. Figure 2 shows the graph of the growth rates of this index, and Table 7 gives their three-year averages. The number of people 'employed' in agriculture is also given in the last column of Table 4. This indicator is based on population censuses and labor force surveys (quoted from Hansen and Radwan, 1982, Table 70), and is likely to miss the year-to-year variations in the 'intensity' of employment in agriculture [9]. Below we will compare the properties

and implications of this index with the new one constructed in this paper.

Employment in crop production has dropped since 1964 (Table 4, column (6)). It went up in 1965, but remained almost constant until 1967. After a temporary sharp rise in 1968, it declined rapidly and was quite low by 1972 (see also Figure 2). The situation improved in 1973 and 1974, but after 1975 agricultural employment fell continuously, and the partial recovery in 1978 seems short-lived. Note that the number of people employed in agriculture follows a different path. According to column (7) of Table 4, agricultural employment was at its peak in 1972 and thereafter declined with a temporary recovery in 1975. Therefore, although the two measures of employment are more or less in agreement in the second half of the seventies, they largely differ in the first half of the decade. This discrepancy is rather puzzling since the agricultural wage rate shows a great deal of flexibility and there is little evidence of unemployment in rural Egypt (Hansen and Radwan, 1982, p. 148). The difference between the two measures may of course be due to the fact that our figures account for employment in cultivation activities only and leave out animal production. However, there is no evidence of an unusual expansion of animal husbandry in the early seventies to support this argument. A more plausible explanation for the difference lies in the fact that "almost half the (paid) employment of the rural population and more than half its money income is derived from non-agricultural activities." (Hansen and Radwan, 1982, p. 140). Therefore, it is not unlikely that when demand for labor in agriculture falls, workers spend more time in

other activities. If this phenomenon is combined with a general slowdown in the urban economy (as was the case in the early seventies), it is possible to see the number of people working in farms go up even if their total daily employment is declining. Evidence of reduced demand for agricultural labor is provided below.

Hansen and Radwan (1982, pp. 154-157) use the number of people employed in agriculture and the wage rate deflated by the agricultural value added to show that labor demand in Egyptian agriculture is wage-elastic and that it can be regarded as a buffer to absorb the employment shocks in other sectors. However, our analysis points to a somewhat different direction. A close examination of the employment-wage relationship in Figure 2 reveals that before 1973 the main variations in the two indices have been by and large parallel. Then, beginning 1973, the real wage and employment started to move in opposite directions. It, thus, seems that before 1973 the agricultural sector faced a rather stable labor-supply curve and employment fluctuations were along this schedule mainly as a result of shifts in the demand curve. However, after 1973 demand remained more or less stable, while supply began to shift and, thus, to drive the real wage rate and the employment level in opposite directions. Therefore, if our observations are correct, wage elasticities of supply and demand curves in the agricultural labor market may be inferred from the relative wage-employment variations in the two sub-periods before and after 1973. It is evident from Figure 2 that fluctuations of the wage rate have been larger than those of the employment level, indicating rather inelastic demand and supply curves [10]. Note that the strong responses of the real wage in the mid-seventies points to a particularly inelastic labor demand schedule. We therefore conclude that

using the agricultural sector as an employment buffer may imply large variations in the wage rate and, thus, considerable changes in income distribution. Evidence on the main trends of factor shares presented in the next section confirms this conclusion and further supports our labor market hypothesis.

5. Factor Incomes and Factor Shares

In this section we examine the trends in the factor distribution of income in agriculture in order to understand how it has responded to the changes in the sector. In the first five columns of Tables 5, nominal per feddan values of labor costs, 'rent', 'profit', and their combinations are given. Indices of 'real' values of these variables, reported in the last five columns of the same tables, are formed by deflating them by the rural cost-of-living index. Table 6, on the other hand, presents the shares of factor and non-factor inputs in the total value of crop production in Egypt.

It is clear from Table 5 that the real labor income per feddan of (physical) agricultural land, after peaking in the mid-sixties, has declined in the late sixties and early seventies. However, it has made a strong recovery during the second half of the seventies. Labor share in the total value of crop output, reported in the first column of Table 6, has also followed a similar path, but with a two-year lag: it fell to its lowest level in 1973 and 1974 and went up quickly in 1975 and again in 1979. It is interesting to note that the trend in the labor share is highly correlated with the trend in the real agricultural wage rate (compare column (5) of Table 4 and the first column of Table 6). This, of course, is a clear indication of a low substitutability between labor and other agricultural inputs, and provides

further evidence for the low elasticity of labor demand in Egyptian agriculture hypothesized in the previous section.

A problem with the labor shares given in Table 6 is that they seem to be rather low when compared with the estimates of other studies of Egyptian agriculture. For example, calculating the agricultural factor shares for 1951, Hansen (1968) finds the share of labor in total production to be 35 percent, which seems unlikely to have dropped to about 17 percent in the mid-sixties. Part of the explanation of this large gap falls on the fact that Hansen's estimate of labor income is based on the number of people employed in agriculture times the average wage rate, assuming full-employment. As mentioned above, while 'full-employment' in rural areas is a valid assumption, it cannot be all attributed to agriculture. Another source of discrepancy between the the two estimates must of course be due to the fact that the relatively more labor intensive animal production activities have not been included in our estimates [11].

The 'rent' category in Tables 5 and 6 refers to the 'official' rent and does not truly reflect the 'market' price of land in Egypt. Note that nominal rents remain essentially constant until 1975, after which, following the spirit of the 'open door' policy, rent controls may have weakened. The 'official' rent data may be of interest for understanding the situation of landlords who could not bypass the rent controls legally and make special arrangements with their tenants. Evidently, the real income and the output share of these 'absentee' landlords has declined more or less continuously throughout the period under consideration.

'Profit' in Tables 5 and 6 is calculated as the residual of gross revenue over the total cost of factor and non-factor (intermediate) inputs plus 'rent.' However, since 'rent' does not reflect the returns to land, the 'profit' which is calculated in this manner includes part of the marginal productivity of land as well as the returns to infrastructure, management and the like. An interesting way to interpret the 'profit' category is to consider it as the income of a capitalist tenant who has rented in a piece of land at the official rates and is exclusively dependent on wage labor for his production. The income of such tenants should, thus, largely depend on the real agricultural wage rates. Indeed, we find that as crop prices fell and real wages rose in the late sixties, real 'profit' declined; but it went up rapidly in the early seventies when the real wage rate began to deteriorate. In the second half of the seventies, real 'profit' has again suffered as a result of the two major wage shocks in 1975 and in 1979. The share of 'profit' in total crop revenue has also had a similar behavior peaking in 1974 when the labor share was at its lowest point.

If one is interested in the total returns to land, or the income of capitalist farmers who own the land under their operation, one has to look at the 'rent plus profit' category [12]. Since 'profit' has a large share in total revenue and fluctuates rather strongly, it dominates the 'rent plus profit' indices as well. Therefore, like 'profit', total profitability of land has had peaks in 1967, 1974, and 1978. It is particularly interesting to note that real profitability of land in terms of consumption goods and in terms of its share in total crop revenue displays a clear negative correlation with the rate

of growth of output. Indeed the highest land shares were attained in the mid-seventies when output growth was the lowest. This observation confirms the hypothesis that profitability could not have played a major role in the aggregate production growth.

On the other hand it indicates that factors which contribute to the growth of output tend to reduce the share of land in total revenue. Therefore, it seems reasonable to assume that the determinates of aggregate growth are mainly land-augmenting activities, and that the elasticity of substitution between land and other factors is rather low. Note in Table 6 that the total returns to land account for about 47 to 65 percent of aggregate crop production. Such a large contribution reflects the key role of land in Egyptian agriculture and explains why land-augmenting investment may have a significant impact on its output. Here we find indicators that such investment may also have strong influences on the distribution of income between land and labor.

Finally, we turn to the indicators of income of farmers who cultivate their own land (mainly small farmers). These indicators are the returns to, and the share of, 'labor plus rent plus profit.' The movements in 'profit' indices again more or less dominate these indicators for the most part, but variations in labor income have a strong counterbalancing effect. The real income of the owner-operated farms seems to have deteriorated in the late sixties, but it has been improving since the early seventies.

6. Non-Factor Inputs and Technical Change

The increase in total factor share--i.e., the share of labor, 'rent', and 'profit'--from about 70 percent in the late sixties to

about 77 percent in the second half of the seventies implies a simultaneous reduction of the share of non-factor (intermediate) inputs from 30 percent down to 23 percent. According to Table 6, the main components of this large decline are the diminishing shares of animal power and of fertilizer. The small share of insecticides has also decreased somewhat. In fact, mechanical power is the only component among non-factor inputs, besides 'sundries,' which has had a rising share in the period under consideration. Seeds and manure seem to have kept their shares more or less constant.

In Table 7, we have compiled the average growth rates of agricultural inputs. Since we had the nominal costs for each input category, we needed appropriate price indices in order to calculate the indices for input volumes. However, only the wage rate and the price of fertilizers were available, and we had to come up with reasonable proxies for other input prices. Since the price of using animals in production is essentially their feed costs, we assumed that revenue per feddan of berseem--the major feed crop in Egypt--is a good proxy for the price of animal power [13]. We have deflated the costs of mechanical power and manure by the official rate of inflation using the rural consumer price index as a proxy. Furthermore, we have assumed that nominal prices of insecticides have remained constant and that the prices of seeds are equal to the lagged prices of crops themselves.

According to Table 7, between 1965 and 1970 inputs of human and animal labor were expanding, but in the 1971-1979 period this process has been reversed and both inputs have been declining with the same speed that they were growing before. On the other hand, uses of

mechanical power, manure, fertilizer and insecticides have continued to expand although at somewhat slower rates [14]. As we have seen in Section 4, the reduction in employment seems to have been a response to the wage hikes following the supply shocks of the mid- and late-seventies. Animal unit costs have also risen sharply during the same period, but unlike labor, animal power has lost its share in total revenue, implying greater substitutability of animals with other inputs in crop production and, thus, a rather elastic demand for animal power. If this argument is correct, a case can be made for the hypothesis put forward by deJanvry and Subarrao (1983) claiming that in the seventies mechanization of Egyptian agriculture has mainly displaced animal power and not human labor which has proven to be a more specific factor.

It is interesting that despite the rapid growth of fertilizer input, its revenue share has continuously declined. This is, of course, due to fertilizer-price controls which have kept the nominal prices of almost all types of fertilizer fixed since 1964 (Cuddihy, 1980, Table V.1). This phenomenon also reappears in the case of insecticides, which are by and large controlled and applied by government agencies.

Let us now look at the behavior of the aggregate input index for which Figure 1 shows the graph of the three-year moving-average growth rates along with similar graphs for aggregate output and real input-price indices (see also Table 7). The real input-price index is simply the aggregate input-volume deflator divided by the aggregate output-price index. All inputs listed in Table 7, except insecticides which are considered fixed costs, are included in the price and volume indices of aggregate input.

The first noticeable point about input and output graphs in Figure 1 is that they are not as highly correlated as one expects them to be. The reason of course lies in the fact that changes in weather and in infrastructure are not captured in our aggregate input index. In Egypt, a large part of variation in agricultural output is due to availability of water and proper drainage facilities which are not under the control of farmers. We will come back to issue of infrastructure below.

The second point about the relationship between aggregate input and aggregate output indices is that to the extent that they are correlated the former has clearly greater variations than the latter. This observation underscores the scarcity of land in Egyptian agriculture and the operation of the law of diminishing returns to variable inputs. However, note that there may have been some productivity gains in the seventies which are reflected in the average growth rate of aggregate input volume being close to zero while output has grown at a rate of over one percent. This productivity gain explains why despite declining real output prices profitability has increased in the seventies.

7. Investment and Infrastructure

The main components of agricultural infrastructure in Egypt are arable land, systems of irrigation and drainage, and research institutions for the improvement of crop varieties. As a tradition, and probably for economic and social reasons, most of these elements have

been developed by the government. Particularly in the last two decades, private investment has constituted only a very small proportion of the total investment in Egyptian agriculture.

In Table 8 we have been able to distinguish two types of agricultural investment: irrigation and drainage on the one hand, and land reclamation, etc., on the other hand. The irrigation and drainage category includes the investment in the Aswan High Dam except the part which is related to power generation. In the 'other' category, land reclamation constitutes the bulk of investment. Unfortunately, we have not been able to find a separate time-series for investment in agricultural research in Egypt.

Several important observations can be made with respect to the two types of investment shown in Table 8. The most important observation is that real investment in irrigation and drainage was cut into half between 1969 and 1971. This was partly due to the completion of the High Dam in 1970, and partly due to the shortage of foreign exchange between the two wars with Israel. However, although total investment in the economy as a whole dwindled in the early seventies, the continuously falling share of agriculture makes it clear that there must have been a deliberate government policy to reduce investment in agriculture. According to Table 8, the share of agriculture in total national investment has dropped from about 20 percent in 1965 to about 6 percent in 1975. Thereafter the decline of the share levels off just above 7 percent. Note that actual real investment in agriculture has increased rapidly in 1977 and 1978. This is a reflection of the

eased foreign exchange situation and the subsequent investment boom in Egypt.

The next observation concerns the differences in the trends of the two types of agricultural investment. Note that the drop in the real investment during the early seventies is much stronger and has a slower recovery for irrigation and drainage than for the 'other' category. Indeed, the level of 'other' investment in 1975 is almost the same as it is in 1965 in real terms, while the volume of irrigation and drainage investment stands about 40 percent below its 1965 level. These facts are indications of the priority of land reclamation in the investment decisions of the government; a policy which has received much criticism from all quarters. Several field studies and econometric works have found land-reclamation projects detrimental to Egyptian agriculture, but the desire to expand the land base of the sector has provided the government with sufficient momentum to proceed with its own policies [15].

Finally, note that the period of reduced investment in agriculture coincides, with a short lag, with the slow down of growth of agricultural production in Egypt. In order to demonstrate the relationship between production and investment in the agriculture sector more emphatically, we have constructed an index of infrastructural 'capital stock' by using the investment data in Table 8 and by assuming an initial growth rate of 3 percent in 1965 and a depreciation rate of 5 percent per year [16]. In Figure 1, we have super-imposed the graph of the three-year moving-average growth rates of this index on that of the aggregate output. The parallel movement of the two curves

in the seventies is quite remarkable [17]. The negative and low growth rates of output around 1967 is of course largely due to the repercussions of the Six-Day War.

8. Conclusion

In this paper we have examined various indices of aggregate performance of Egyptian agriculture in recent years. We have found that in the seventies, the aggregate growth of crop production in Egypt has slowed down. We have also found that aggregate real output prices (aggregate output prices deflated by input prices) although on average declining, have been moving counter-cyclically. Since such price movements cannot account for the observed cycles of aggregate output, we are confronted with the puzzle of the source of these fluctuations. A plausible factor which may explain a great deal of the main trends in the aggregate output is investment in agricultural infrastructure. For this hypothesis to be true, however, aggregate production should be rather insensitive to prices, which seems to be the case according to our price-quantity and factor-shares evidence. Thus, we find that the decline of investment in irrigation and drainage as well as in other projects which affect the fertility of land go a long way towards explaining the slow growth of Egyptian agriculture in the seventies.

As we have seen, total returns to land, which includes the returns to infrastructure, amount to about 47 to 65 percent of total crop revenue. This reflects the significance of the contribution of this factor to production. Therefore, expansion of production is very much dependent on the extent to which land can be vertically or horizontally augmented. Horizontal extension of agricultural land has not

proven very successful yet, and has received a great deal of criticism. On the other hand, vertical extension through improvements in irrigation and particularly in drainage systems, has been found quite effective, but seems rather neglected by the policy-makers. Due to the low elasticity of substitution among land, labor, and other factors, augmentation of land has an important implication for income distribution as well: as production expands and the demand for variable inputs goes up, the share of land falls and the share of labor rises. Exactly the opposite of this process occurred in the mid-seventies. This effect has been so far overlooked by most students of Egyptian agriculture.

Insensitivity of aggregate output to prices does not necessarily imply inelastic demand for all inputs. Since land is the major fixed factor constraining production, demand for some inputs may be highly responsive to prices without output being significantly affected. Demand for animal power, due to its apparent substitutability with mechanical power, belongs to this category. However, demand for labor does not seem to be very elastic. Evidence supporting this claim has been provided by the large responses of the real wage rate to the shifts in the agricultural labor supply after 1973. Implications of this hypothesis for changes in income distribution are of course far reaching. It particularly implies that using agriculture as an absorbent of employment shocks in the rest of the economy--suggested by Hansen and Radwan (1982)--may lead to significant changes in income distribution. Indeed, in this paper, we find that the agricultural factor shares in the past decade have been highly variable and strongly affected by the real wage shocks.

Notes

[1] See, for example, Hansen and Nashashibi (1975), Cuddihy (1980), and von Braun (1980).

[2] For examples of recent debates on Egypt's economic policies see: Ikram (1980), Richards (1980), Hansen and Radwan (1982), Richards and Martin (1983), and those mentioned in footnote [1].

[3] We have analyzed the regional aspects of Egyptian agricultural development elsewhere in Esfahani (1985).

[4] If there are n components $x_{i,t}$, i=1,...,n. their Trongvist-Theil aggregate index Q in period t is defined by:

$$d(\log Q) = \sum_{i=1}^{n} s_{i,t} d(\log[x_{i,t}/x_{i,t-1}])$$

where $s_{i,t}$ is the two-year (t and t-1) moving average of the share of component i in the total value of all components.

[5] The question whether our estimates have any value or not depends crucially on the relationship between cultivation and animal husbandry in agriculture. If these are inseparable activities, then our estimates are quite deficient. However, to the extent that these two activities are separate lines of production with simple input-output relationships, concentrating on one activity alone can still be quite fruitful. Note that if the activities of rural households are the focus of attention, animal husbandry should be included in the picture, but so should many non-agricultural activities, since only about one half of incomes in rural Egypt are derived from agriculture (Hansen and Radwan, 1982, p. 99).

[6] The output growth rates in Table 3 belong to the primary products of crops. Investigation of the data indicates a very close relationship between the outputs of primary and secondary products of all of the crops under consideration.

[7] Esfahani (1985) provides cross-sectional evidence for the low price responsiveness of aggregate supply in four main agricultural regions in Egypt. Our econometric work on six governorates in the Delta region (Esfahani, 1984) also confrims this hypothesis.

[8] Total labor cost includes both costs of hired and (imputed) family labor. Cost of labor in the Ministry of Agriculture data base is not broken down into male, female, or child labor categories. However, as long as the wage rates for these types of labor move together, our employment index will measure the 'male-equivalent' of all types of labor. Indeed, very close relationships have been observed in the agricultural labor market among the wage rates of men, women, and children in the past two decades (see Mohie-Eldin, 1982).

[9] Labor Force Surveys are carried out during the month of June which is a peak season in Egyptian agriculture. This data may not reflect any variations in employment in the rest of the year. It also does not measure the variations in female labor force which is usually highly underestimated in surveys and censuses.

[10] Our econometric work on the Delta region (Esfahani, 1984) supports this hypothesis. Further cross-sectional evidence is presented in Esfahani (1985).

[11] Mohie-Eldin (1982) also presents estimates of the shares of labor between 1960 and 1976 which are about 25 to 35 percent higher than those given in Table 6. His value added and labor income data are based on the Ministry of Planning's follow-up reports which are rather crude estimates. However, the trend in Mohie-Eldin's estimate is very similar to the results obtained in this paper.

[12] Hansen's estimates of rent and profit shares in 1951 are 44 and 13 percent, respectively (Hansen, 1968; Table 2). These estimates are markedly different from what we observe in Table 6. However, note that the sum of rent and profit share estimated by Hansen is 57 percent which is in the range of property income shares we find in this paper.

[13] Separate data for price and yield of berseem are not available.

[14] Note that mechanical power use starts from a very limited base in the mid-sixties and even small changes in its absolute value give rise to the erratic growth rates observed in 1968-1970.

[15] For a discussion on this point see Ikram (1980). For an example of econometric work see Esfahani (1984).

[16] The shape of the resulting curve and its correlation with production behavior is not sensitive to these assumptions.

[17] Econometric testing of this hypothesis for six governorates in the Delta region can be found in Esfahani (1984).

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TABLE 1
AVERAGE SHARES OF CROPS IN THE TOTAL VALUE
OF CROP PRODUCTION IN EGYPT: 1965-1979
(percentages)

CROPS \ YEARS	65-67	68-70	71-73	74-76	77-79
BARLEY	0.71	0.57	0.52	0.63	0.61
BEANS	2.95	2.30	2.30	2.26	1.97
BERSEEM,LONG	17.53	14.46	16.73	17.45	21.24
BERSEEM,SHORT	8.86	5.69	6.49	5.78	6.32
COTTON	23.59	25.15	22.65	16.95	16.74
FLAX	0.10	0.16	0.18	0.28	0.32
GROUNDNUTS	0.61	0.54	0.34	0.38	0.37
LENTILS	0.61	0.46	0.73	0.53	0.18
MAIZE,SUMMER	9.56	10.39	10.99	10.96	10.63
MAIZE,NILI	2.82	2.17	1.92	2.30	2.72
ONIONS	0.67	0.54	0.53	0.56	0.41
POTATOES,NILI	0.62	0.85	1.14	1.73	1.86
POTATOES,SUMMER	0.71	0.78	1.01	1.65	2.07
RICE	8.01	12.07	8.80	8.70	8.59
SESAME	0.23	0.28	0.36	0.23	0.23
SORGHUM	3.59	3.61	3.62	3.03	2.39
SUGAR CANE	2.27	2.99	3.02	4.97	4.62
TOMATOES,NILI	2.03	2.10	3.69	4.20	2.41
TOMATOES,SUMMER	1.85	2.19	1.99	2.15	2.74
TOMATOES,WINTER	2.18	2.62	2.64	3.88	3.25
WHEAT	10.49	10.10	10.35	11.40	10.33
TOTAL	100.00	100.00	100.00	100.00	100.00

Source: Computed from Ministry of Agriculture data.

TABLE 2
GROWTH RATES OF CROP PRODUCTION AND PRICES
IN RURAL EGYPT: 1965-1979

YEARS	AGGREGATE PRODUCTION	AGGREGATE OUTPUT PRICES	AVERAGE AGRICULTURAL WAGE RATE	COST OF LIVING INDEX	REAL AGGREGATE INPUT PRICE
65-67	-0.93	5.74	6.39	-4.01	-0.49
68-70	4.69	-2.72	0.00	6.15	1.75
71-73	1.01	8.64	5.18	4.59	-3.32
74-76	1.11	11.13	24.83	11.98	4.53
77-79	1.42	13.23	18.15	9.66	0.99
65-70	1.88	1.51	3.20	1.07	0.63
71-79	1.18	11.00	16.05	8.74	0.73

Sources: Cost of living index: Central Agency for Public Mobilization and Statistics (CAPMAS).
Others: computed from Ministry of Agriculture data.

TABLE 3

AVERAGE GROWTH RATES OF OUTPUTS AND FARM-GATE PRICES
OF EGYPTIAN CROPS: 1965-1979[1]

	OUTPUT					PRICE				
CROPS \ YEARS	65-67	68-70	71-73	74-76	77-79	65-67	68-70	71-73	74-76	77-79
BARLEY	-11.64	-6.00	4.69	8.39	-0.40	4.26	-3.11	4.05	10.62	11.17
BEANS	-22.18	12.99	-0.58	-2.31	-2.54	4.50	-6.70	4.55	21.30	11.02
BERSEEM,LONG[2]	7.48	1.02	1.50	2.43	0.68	0.70	-8.23	16.03	9.37	15.86
BERSEEM,SHORT[2]	-1.57	-0.39	1.50	-6.83	-0.47	0.49	-8.45	16.69	8.06	16.27
COTTON	-5.78	5.02	-0.87	-7.75	5.73	0.68	2.07	2.70	16.43	12.76
FLAX	-14.26	1.74	23.07	7.42	11.83	4.64	3.41	9.04	11.18	12.51
GROUNDNUTS	-12.26	6.01	-13.02	3.17	-1.82	15.41	-2.10	1.93	22.03	14.91
LENTILS	-14.52	-0.75	20.65	-16.19	-47.57	13.38	1.99	2.15	10.32	17.40
MAIZE,SUMMER	35.59	4.20	2.50	5.82	-2.42	11.15	-3.40	11.32	3.62	14.73
MAIZE,NILI	-39.35	-0.37	-3.57	10.14	4.53	9.69	-3.57	13.03	2.77	15.35
ONIONS	-8.17	-7.44	0.41	1.38	-14.14	6.65	3.37	10.36	14.17	14.00
POTATOES,NILI	-14.24	28.11	12.50	5.83	-0.85	19.75	-8.50	3.72	31.11	7.88
POTATOES,SUMMER	-6.29	17.38	12.43	1.40	10.04	11.05	-0.10	2.68	33.79	4.59
RICE	3.82	4.44	-4.51	0.34	2.94	12.74	-1.96	2.16	18.82	9.96
SESAME	-37.98	33.02	2.07	-16.61	-0.96	10.20	1.84	2.65	14.39	25.09
SORGHUM	6.99	-0.02	-0.45	-4.53	-4.97	9.34	-1.43	12.36	4.34	12.02
SUGAR CANE	2.43	9.20	1.89	4.64	1.33	6.61	0.52	8.65	26.96	13.44
TOMATOES,NILI	1.58	7.53	8.15	1.03	-4.26	3.56	7.13	21.94	3.39	2.81
TOMATOES,SUMMER	10.60	-0.09	-0.21	12.91	8.56	9.13	0.79	9.88	-1.63	20.11
TOMATOES,WINTER	-12.58	19.29	-10.61	16.90	10.96	32.37	-20.51	24.01	3.54	-2.67
WHEAT	-4.87	5.40	6.39	2.16	-1.83	9.77	2.26	-0.98	8.42	17.23
AVERAGE AGRIC. WAGE RATE	-	-	-	-	-	6.39	0.00	5.18	24.83	18.15
COST OF LIVING INDEX	-	-	-	-	-	-4.01	6.15	4.59	11.98	9.66
PRICE OF BEEF	-	-	-	-	-	3.98	5.12	4.74	16.91	10.16
PRICE OF MILK	-	-	-	-	-	12.97	-4.70	7.88	16.76	13.46

[1] Weighted averages of prices of primary and secondary products.

[2] Instead of output and price of berseem, its area and revenue per feddan are used. Data on price and yield of berseem is available only for 1978 and 1979.

Source: Computed from Ministry of Agriculture data. For cost of living index see Table 6.

TABLE 4

WAGES AND EMPLOYMENT IN EGYPTIAN AGRICULTURE: 1964-1979

YEAR	AVERAGE AGRICULTURAL WAGE RATE (PT PER DAY) (1)	COST OF LIVING INDEX (1964=100) (2)	REAL CONSUMPTION WAGE INDEX (1964=100) (3):(1)/(2)	AGGREGATE OUTPUT PRICE INDEX (1964=100) (4)	REAL PRODUCT WAGE INDEX (1964=100) (5):(1)/(3)	AGRICULTURAL EMPLOYMENT INDEX (1964=100) (6)	NUMBER OF PEOPLE EMPLOYED IN AGRICULTURE ('000) (7)
1964	19.0	100.0	100.0	100.0	100.0	100.0	n.a.
1965	22.0	118.5	97.7	105.1	110.2	111.9	n.a.
1966	25.0	106.9	123.1	116.0	113.4	110.8	4300
1967	25.0	109.4	120.3	118.8	110.8	111.4	n.a.
1968	24.0	113.9	110.9	102.8	122.9	119.4	4781
1969	25.0	122.4	107.5	106.2	124.0	114.6	n.a.
1970	25.0	131.5	100.0	109.5	120.2	111.5	n.a.
1971	25.5	132.5	101.3	111.1	120.8	109.5	5085
1972	27.5	139.9	103.4	122.1	118.5	98.1	5294
1973	29.2	150.9	101.8	141.9	108.3	102.5	5005
1974	32.2	171.9	98.6	174.5	97.1	112.3	4776
1975	46.5	192.9	126.9	177.5	137.9	104.4	5033
1976	61.5	216.2	149.7	198.2	163.4	98.3	4900
1977	76.4	237.2	169.5	243.9	164.9	95.2	4767
1978	88.5	273.7	170.2	300.0	155.3	98.0	4523
1979	106.0	289.0	193.1	294.7	189.3	96.9	n.a.

n.a. Not Available.

Sources: Cost of living index: Central Agency for Public Mobilization and Statistics (CAPMAS).
Number of people employed in agriculture: Hansen and Radwan(1980, Table 70);
Others: computed from Ministry of Agriculture data.

TABLE 5

MEASURES OF NOMINAL AND REAL PROFITABILITY OF LAND IN EGYPT: 1964-1979

	NOMINAL (LE PER FEDDAN)					REAL INDICES (1964=100)*				
YEAR	LABOR	RENT	PROFIT	RENT+ PROFIT	LABOR+ RENT+ PROFIT	LABOR	RENT	PROFIT	RENT+ PROFIT	LABOR+ RENT+ PROFIT
1964	14.34	23.33	39.45	62.78	77.12	100.00	100.00	100.00	100.00	100.00
1965	18.92	24.95	34.39	59.35	78.26	111.37	90.28	73.58	79.78	85.65
1966	20.69	25.25	36.30	61.55	82.23	135.01	101.29	86.08	91.73	99.78
1967	20.98	25.14	37.98	63.13	84.10	133.79	98.56	88.04	91.95	99.72
1968	21.04	25.23	24.84	50.07	71.11	128.88	94.99	55.30	70.05	80.99
1969	21.08	26.02	30.72	56.74	77.82	120.17	91.13	63.62	73.84	82.45
1970	20.70	26.69	40.19	66.89	87.59	109.80	87.00	77.46	81.01	86.36
1971	20.62	26.02	43.15	69.17	89.79	108.59	84.21	82.56	83.17	87.90
1972	19.81	26.47	57.93	84.41	104.21	98.74	81.10	104.94	96.08	96.57
1973	21.87	27.01	75.32	102.33	124.20	101.05	76.70	126.48	107.98	106.70
1974	26.33	28.21	98.00	126.21	152.54	106.83	70.35	144.48	116.93	115.05
1975	34.99	29.54	88.11	117.65	152.63	126.52	65.65	115.77	97.15	102.61
1976	43.60	34.47	96.39	130.86	174.46	140.65	68.34	112.99	96.40	104.62
1977	52.57	36.97	122.59	159.57	212.14	154.60	66.82	130.99	107.15	115.97
1978	62.66	39.09	174.36	213.45	276.11	159.69	61.22	161.47	124.22	130.81
1979	73.99	57.51	140.54	198.05	272.03	178.59	85.30	123.27	109.16	122.07

* Nominal values deflated by the rural cost of living index.

Sources: Cost of living index: CAPMAS; others: computed from Ministry of Agriculture data.

TABLE 6
INPUT SHARES IN THE TOTAL CROP REVENUE IN EGYPT: 1964-1979

YEAR	LABOR	ANIMAL POWER	MECHANICAL POWER	SEEDS	MANURE	FERTI-LIZER	INSECTI-CIDES	SUNDRIES	RENT	PROFIT	RENT+ PROFIT	LABOR+ RENT+ PROFIT
1964	14.17	6.14	1.88	4.49	2.79	5.13	1.53	0.87	23.06	39.00	62.05	76.22
1965	17.61	7.87	1.52	4.18	3.07	5.55	1.96	0.94	23.23	32.02	55.24	72.85
1966	18.00	7.69	1.66	4.25	3.04	6.55	2.34	0.97	21.98	31.59	53.57	71.57
1967	18.02	7.30	1.79	4.52	3.14	6.64	1.22	1.00	21.60	32.64	54.24	72.26
1968	19.81	8.39	2.25	5.42	3.74	7.61	1.16	1.13	23.76	23.39	47.15	66.96
1969	18.29	5.34	5.08	4.87	3.40	7.26	1.76	1.03	22.57	26.64	49.21	67.50
1970	17.04	4.83	5.88	4.83	3.19	7.39	1.77	1.04	21.97	33.09	55.06	72.10
1971	16.57	4.91	5.51	4.84	3.19	7.16	2.24	1.08	20.91	34.68	55.59	72.17
1972	14.31	4.39	5.12	4.41	3.22	6.56	1.04	0.99	19.12	41.85	60.97	75.28
1973	13.72	3.61	4.30	4.13	2.90	6.02	1.10	0.88	16.95	47.27	64.22	77.94
1974	13.69	3.40	4.23	3.86	2.69	5.43	1.05	0.92	14.67	50.97	65.64	79.34
1975	17.55	3.54	5.33	4.64	3.44	5.30	1.19	1.51	14.82	44.20	59.02	76.57
1976	19.24	3.86	5.39	4.75	3.08	4.93	1.01	1.42	15.21	42.53	57.73	76.97
1977	19.24	3.80	5.18	5.03	2.86	4.55	0.95	1.28	13.53	44.86	58.39	77.63
1978	17.92	3.31	5.08	5.52	2.59	3.84	0.71	1.34	11.18	49.86	61.04	78.95
1979	21.11	4.15	5.10	4.46	2.91	4.25	1.51	1.54	16.41	40.10	56.51	77.62

Source: Computed from the Ministry of Agriculture data.

TABLE 7
AVERAGE GROWTH RATES OF THE MAIN AGRICULTURAL INPUTS
IN EGYPT: 1965-1979

YEARS	LABOR	ANIMAL POWER	MECHANICAL POWER	SEEDS	MANURE	FERTILIZER	INSECTI-CIDES	AGGREGATE INPUT
65-67	3.61	9.80	0.04	-1.67	5.67	13.34	-2.70	5.47
68-70	0.02	-3.62	35.43	7.08	-3.68	5.47	14.23	4.25
71-73	-2.81	-16.13	-5.44	-0.34	1.79	2.79	-6.39	-3.02
74-76	-1.40	5.04	7.73	4.41	2.23	5.51	9.33	2.29
77-79	-0.46	1.06	3.07	-5.01	3.01	9.59	28.10	0.94
65-70	1.82	3.09	17.73	2.70	1.00	9.40	5.76	4.86
71-79	-1.56	-3.34	1.78	-0.31	2.34	5.96	10.35	0.07

Source: Calculated from Ministry of Agriculture data.

TABLE 8

AGRICULTURAL INVESTMENT IN EGYPT: 1965-1978

YEAR	CURRENT PRICES*		CONSTANT 1965 PRICES*		PERCENT OF TOTAL INVESTMENT	
	DRAINAGE/ IRRIGATION	OTHER	DRAINAGE/ IRRIGATION	OTHER	DRAINAGE/ IRRIGATION	OTHER
1965	51.6	30.7	51.6	30.7	12.5	7.4
1966	50.9	31.1	47.5	29.1	12.2	7.5
1967	31.6	24.6	28.5	22.2	8.7	6.8
1968	42.0	25.6	37.6	22.9	12.7	7.8
1969	34.3	27.0	30.2	23.7	9.3	7.4
1970	25.4	27.9	20.2	22.2	6.0	6.5
1971	21.6	22.3	15.0	15.5	5.0	5.2
1972	22.0	28.3	16.1	20.7	5.3	6.8
1973	22.4	35.2	18.0	28.2	5.0	7.9
1974	21.5	32.7	17.5	26.6	2.9	4.5
1975	41.7	42.4	29.7	30.2	3.1	3.2
1976	99.4		64.3		7.1	
1977	139.0		72.6		7.3	
1978	179.0		82.9		7.5	

* Millions of LE. Investment at constant prices calculated by dividing nominal values by a price index for total investment.

Source: Computed from Ikram(1980, SA Table 9).

Figure 1

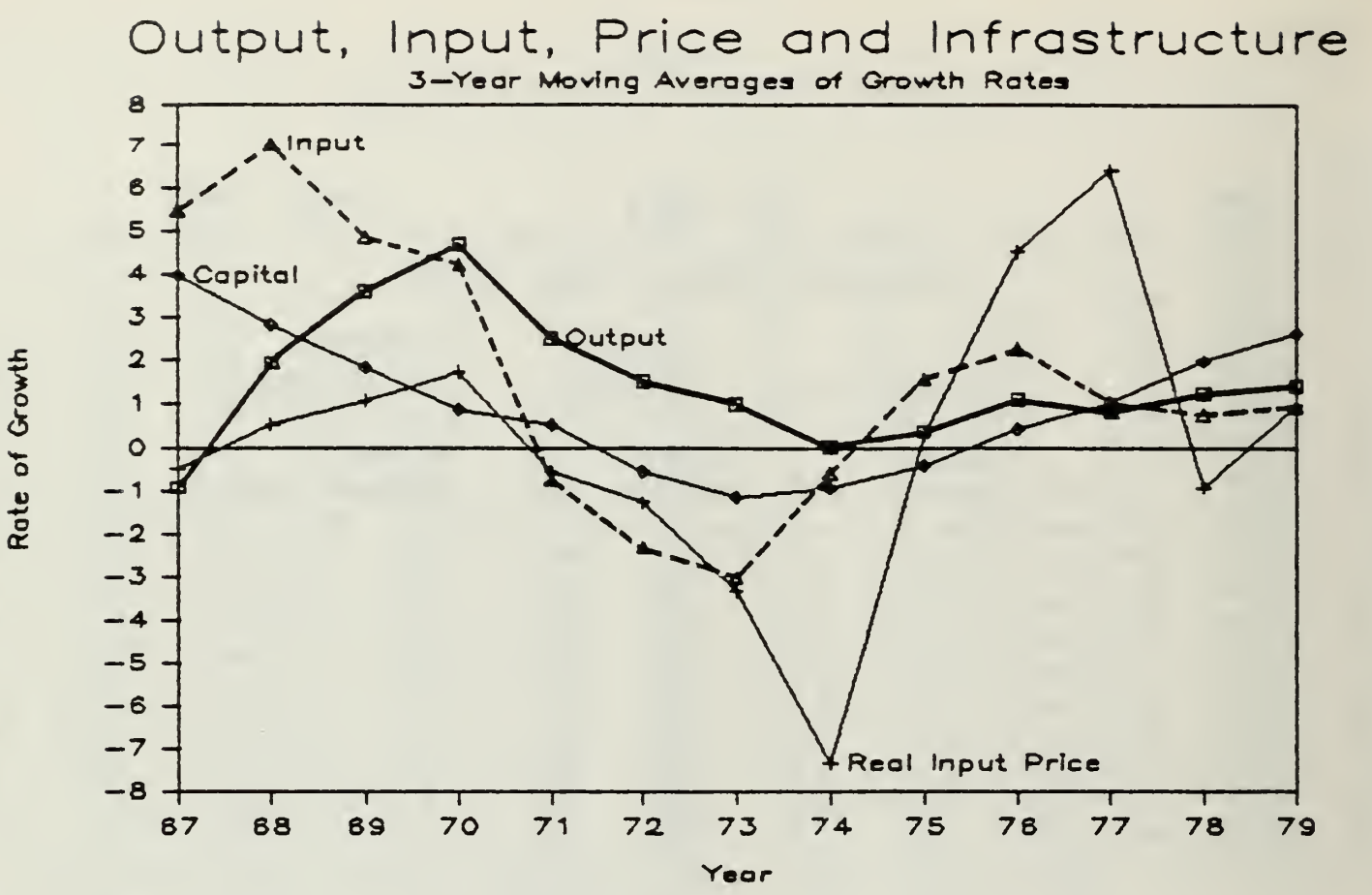

Figure 2